THE

FOUNDRY TRADE JOURNAL

WITH WHICH IS INCORPORATED

THE IRON AND STEEL TRADES JOURNAL

VOL. 62 Thursday, April 11, 1940 No. 1234

PUBLISHED WEEKLY

Subscription Terms: 17s. 6d. per annum.
Foreign and Colonial: 20s. per annum.
All Subscriptions are payable in advance.

THE FOUNDRY TRADE JOURNAL
49, Wellington Street, London, W.C.2.

EMERGENCY ADDRESS
to which all communications should be sent until further notice:—
3, Amersham Road, HIGH WYCOMBE, Bucks.
Telegraphic Address: "Zacatecas, High Wycombe."
Telephone: HIGH WYCOMBE 1792 (3 lines).

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The Institute of Vitreous Enamellers
The Welsh Engineers' and Founders' Association
The Foundry Trades' Equipment and Supplies Association

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Gathering Momentum

When the war broke out, the dislocation consequent thereupon reacted in varying degrees upon the numerous technical institutions of Great Britain. They followed the same course as the great commercial houses, in that a few evacuated, some carried on as usual, and others closed down their Branches. During the past six months there has been a general tendency for technical institutions to gather momentum, even to the extent of organising such social activities as annual dinners and works visits. What was perhaps unique was the staging of an exhibition of enamelware last Saturday by the London Section of the Institute of Vitreous Enamellers. This Section has only a membership of between twenty and thirty, yet because of the enthusiasm of the local committee, headed by Mr. G. H. Abbott (its chairman) and Mr. Alistair McLeod (the honorary secretary), an exhibition was staged in the Charing Cross Hotel at which there were some thirty exhibitors and more than 1,000 exhibits. The attendance was excellent, and the general approbation accorded to the organisation, methodical display and the interesting character of the exhibits was well merited. The exhibition suffered not one iota from the incidence of the war.

The work of the Institute of British Foundrymen since the war has been outstandingly successful, marred only by the lethargy of two Branches. There may be some excuse in one case, but in the second the fact that sister associations in the same city have been particularly active makes it difficult to believe that local conditions are of such a character as to militate against successful meetings. Elsewhere in this issue are published preliminary details of the forthcoming annual general meeting of the Institute, which is to take place at Cheltenham early in June. It is hoped that this meeting will act as a stimulus not only to the less active Branches but also to the functioning of the technical sub-committees. Because of the relative smallness of the United Kingdom, people are far too prone to rely on personal contact for the conduct of sub-committees, and here one could usefully take a lead from America, where geographical conditions make reliance upon correspondence imperative. This method has been very successfully used by Mr. H. H. Shepherd, chairman of the East Anglian Section of the Institute, and his monthly letters to the members have doubtlessly been the means of placing the local organisation upon a firm and lasting foundation. Its first wartime meeting included a works visit, possibly the first to take place since last September.

Breaking with tradition, some Branches intend completing or extending their activities by holding meetings during the summer. As social activities have not yet assumed the pre-war level, there is every reason to anticipate that they will be successful, especially if imagination and enthusiasm are shown by the local committees.

It is pleasing to learn that the Association Technique de Fonderie has resumed activities in a slightly modified form. The Association has linked itself to the employers' federation, the research association, and the Paris Foundry School for aiding the service departments. The monthly consultative meetings held since the outbreak of war are now being followed by short lectures and discussions upon questions affecting armaments. The first of these lectures was given in December by Prof. Chaudron on "Rapid Methods of Gas Analysis in Metals and the Rôle of Chemical Analysis in Wartime." A good deal of attention is also being paid to standardisation.

International co-operation is continuing by the exchange of Papers with the American Foundrymen's Association. The Presidency of the International Foundry Technical Committee is, at the request of Mr. J. Lobstein, remaining for the time being in Dr. Guido Vanzetti's capable hands.

In conclusion, it seems safe to say that the activities of the technical institutions both in France and the United Kingdom are gathering momentum, and apart from the obviously desirable restriction of social activities during wartime, the fundamental work is rapidly approaching normal. There is an increasing recognition in all circles, from the State downwards, of the fact that the utility of such institutions is enhanced in times like the present.

An Enamelling Exhibition

SUCCESSFUL LONDON VENTURE

Last Saturday afternoon, at the Charing Cross Hotel, the London Section of the Institute of Vitreous Enamellers staged an extremely successful exhibition designed to show typical examples of enamelled articles made in the London area; methods of testing efficiency; the occurrence and elimination of defects; and the artistic development of enamelling. The committee responsible for the organisation was composed of Mr. G. H. Abbott (chairman), Mr. V. C. Faulkner, Mr. B. B. Kent, Mr. W. Thomas and Mr. Alistair McLeod (honorary secretary). Most of the work, however, was carried through by Mr. Abbott and Mr. McLeod, and it was particularly unfortunate that indisposition prevented the chairman from being present. The opening ceremony was performed in his absence by Mr. B. B. Kent.

It is difficult to estimate the actual number of exhibitors as some exhibits were reinforced by loans. Actually some twenty-five names were listed. The general arrangement was that surrounding the room was a series of tables with white cloths, and the centre was occupied with rows of chairs facing the high table. An important feature of the afternoon was a lecture by Mr. W. E. Charles on the enamelling of copper and jewellery. The lecturer's table was of outstanding interest as on it were arranged many dozens of examples of ancient and modern artistic enamelling on dressing-table sets, vases, military badges, letters for name plates, as well as examples of the colour powders made by the lecturer's firm, the Blythe Colour Works. The commercial position of these colours is that the country is now virtually independent of foreign imports. At the back of the table and in other positions were numerous London-made advertising signs, such as Underground maps, A.R.P. signs and well-known commercial signs.

The Exhibits

Making a tour of the exhibits from the right-hand corner of the lecturer's table, the first "stand" was occupied by Belling & Company, who showed two examples of their latest majolica electric fires and an electric cooker carried out in white. After opening the oven door, a foot-operated lever controlled the opening of an inner glass door. The adjoining exhibit was by Ferramic Industries, Limited, and here, in addition to displaying a wide range of commercial frits, Mr. C. P. Stone brought along his fine example of Leonardo da Vinci's "Last Supper," reproduced as an enamelled casting. Added colour was lent to the exhibit by a pair of firedogs concealed at the back of two heraldic figures.

Nearby, the Cronite Foundry Company had a display of nickel-chromium alloy perrets, together with some examples of defects caused by their faulty use. The Armco concern showed a useful range of literature dealing with their irons, as well as examples of high-grade enamel work carried out on their products. Mr. W. Thomas, of Metters, Limited, of Sydney and elsewhere in Australia, arranged a fine display of photographs, showing both the details of their well-arranged enamelling shops and the products which they make for the local market.

The Gas Light & Coke Company set out a stand to show just what the public required from the enameller. A large card placed against the wall had ribbons stretching from it to examples of defects. Demonstrations were given as to the influence of various commercial polishes on the ware, as well as the influence of culinary acids. The raised lettering so often used by foundrymen was condemned as a dirt trap and the use of flat coloured printing advocated. Attention was called to inadequacy of the "imitation" coal as now used in gas and electric stoves. THE FOUNDRY TRADE JOURNAL and "Sheet Metal Industries" showed copies of their publications, sharing a table with the Institute and the British Cast Iron Research Association. The former showed the literature it has published, its labels and transfers, whilst the latter had a quantity of scientific apparatus and the standardised bowls used for evaluating the resistance of enamels to acid attack. On this and other stands was apparatus for determining the thickness of enamel deposits by various electrical means.

Along the opposite wall the corner "stand" was occupied by the Sterling Manufacturing Company. A mangle, the first commercial article to be produced as enamelled ware by this concern, was shown as what is still one of the newer applications. At the back of the table was a Ford car wheel with an enamelled hub. This had done 20,000 miles, and was still without blemish. Here the enameller is in advance of the motor-vehicle industry. The works chemist, Dr. Deutsch, exhibited some fine photomicrographs of defects. The United Glass Bottle Company had a number of very fine examples of enamelling on glass bottles; some of the labels were good imitations of paper stick-on labels, whilst others were carried out in Chinese and Indian characters. On this stand a

(*Continued on page* 282.)

I.B.F. Annual Conference at Cheltenham on June 7 and 8

Prior to the outbreak of war, the Institute of British Foundrymen had made provisional arrangements for the 1940 annual Conference to be held at Middlesbrough. It was then felt, however, that the circumstances were not favourable to holding a three-day conference on the usual lines, and the decision was reached to hold the Conference this year at Cheltenham on Friday evening, June 7, and Saturday, June 8.

The provisional programme provides for the holding of the meeting of the Council of the Institute and of various standing committees on Friday evening, June 7, and the annual general meeting will be held in the morning of June 8. This will be followed by the presentation and discussion of Papers, arrangements for which are well in hand. A dinner will be held on the Saturday evening, and this will be followed by dancing, at the invitation of the Mayor of Cheltenham.

The detailed programme is now being worked out, and copies will be forwarded to all members of the Institute shortly. Communications relating to the Conference should be sent to the Secretary of the Institute, Mr. T. Makemson, St. John Street Chambers, Deansgate, Manchester, 3.

Random Shots

It has become trite to declare that there is nothing new under the sun; but the truth of the saying never fails to strike "Marksman" forcibly each time fresh evidence comes to light that some invention just hailed as slap up to the minute is at the best only an adaptation of a practice in vogue maybe centuries ago. The armoured tank used in modern warfare is so patently a product of the mechanical age that it is difficult to imagine the "asparagus-beds" specially constructed to deter the progress of the tanks as anything but a very modern idea. But listen to this account of how the Tartars, in the time of the great leader Kublai Khan in the 13th century, set out to destroy the alligators which were such a terror in certain parts of the land.

* * *

"When they see that, in order to drink, the snake usually follows a given course leading to some steep bank, they plant on the slope of the latter a big and strong wooden stake so deep into the ground as to be barely visible; on the top of the stake is fitted a steel blade, as sharp as a razor or as a lance-point; this sticks out about a palm above the stake, and is slightly inclined in the direction from which the snake usually comes. Of such stakes and blades the hunters plant a large number. When the proper time comes round, the snake or serpent goes down towards the river to drink, and since on reaching the place where these blades are, it tumbles rapidly on, on account of the steep slope, it strikes so hard against these blades, that it is ripped up from the breast to the navel, so that it dies on the spot."

* * *

That description is from the "Travels of Marco Polo," a book so teeming with other examples of the same phenomena that, after having recently re-read it, "Marksman" began to wonder whether the present Western civilisation is but a re-incarnation of a former Eastern culture. There is an account, for instance, of how Kublai Khan instituted a system of paper money almost identical with that in use in modern Europe, whilst the present control of the diamond market bears a close resemblance to the control of the precious stone market of Kublai Khan's time. "The king has them dug up on his own account, and no one else could go to that mountain to dig for Balas rubies without being immediately put to death; moreover, should anyone take them out of the kingdom, he would forfeit both his life and his goods. For the king sends them by means of his own men to other kings and princes and great lords, to some as tribute and to others as gifts; some too he has sold for gold and silver. This the king does in order that the Balas rubies may remain costly and valuable, even as they are. For if he were to allow others to dig for them and carry them about the world, so many would be extricated that they would no longer be so costly and valuable."

* * *

A little story comes to mind which aptly makes a comparison of old and new from another angle. A youngster went to London with his auntie some time before the war to see the sights, which inevitably included the guard at Buckingham Palace. Eyeing with awe the soldiers resplendent in their scarlet uniforms and busbies, he asked "Auntie, are they real?" The same child, a few weeks after the war had started, was taken past the Palace once again. This time the guard was dressed in khaki, and the only remark the sight evoked from this former youthful admirer was "Gosh! I wish I'd brought my pea-shooter!"

"MARKSMAN."

The Merchandising of Castings*

By R. B. TEMPLETON

Present-day selling or marketing is the most important phase of every business in the world, and the problem of how to make sales at a profit is vital to every foundryman. It is also the problem of every one of his customers, and in that very fact lies his opportunity. The definition of marketing is a planned method of selling, combined with common sense, and the first principle is to understand why and for what reasons a man buys.

Prehistoric Organisation

A few liberties with history can usefully be taken to draw a brief picture of buying in prehistoric days. Conditions were then simple and virile. What each man needed, he went out armed with a club and took. The process was, it is thought, called "planned buying." Gradually individuals grouped themselves into tribes, because some of them were good at one thing and not so good at others. There was one man in the group who was good at organising. He was generally the type who did not like practical work, but was able to get others not so gifted to work for him. In return he gave the group his leadership and ability to think things out. He became the first *company director.*

This man was cursed with a form of discontent—divine discontent. He was always looking for improvement and progress, better conditions for himself, and less hard work. He soon found he needed resources and capital on which to work. His tribe began to flourish and wanted the ever-growing necessities of life, so his first step was to secure a helper who could obtain for him the greatest value at the lowest cost. He found a man with these devilish characteristics, and this man became the first *purchasing agent.*

The tribe prospered because its members could obtain and use the necessities of life, but they lacked protection. The leader saw that they needed better weapons, better tools and better conveyances, so he looked round the tribe, and as a good leader does he soon found his man.

This man was good at thinking out new things and was concerned about improvements, adaptability, quality and stamina. He was no good at bargaining, and hated haggling about prices as much as the purchasing agent loved it. This man became the first *engineer or designer,* and it was not long before he had designed more things than the workers in the tribe could make without some better organisation.

The leader looked about again and found a man whose hands were capable of forming the new things which the engineer had planned, and he became the first *production superintendent.*

Fundamental Buying Factors

The above discloses the four fundamental buying factors, and they are:—

(1) Management or policy.
(2) Purchasing or price.
(3) Engineering or adaptability.
(4) Production or workability.

Management is interested to-day in policies more than ever it was. Purchasing is the proper and important function of getting as much value for as little as possible. Engineering looks always for ways and means to improve the products it creates. Production fits each material to the facilities it has for working it.

This brings the subject to the selling plan of campaign, which can be divided into four parts:—

(1) The market or place where potential customers exist.
(2) The buyer or person whose interests need the product that is for sale.
(3) The approach or the best method of reaching the notice of the buyer.
(4) The sales appeal—telling the story properly.

The First Sale

Again reverting to history, it is of interest to see how the first director or manager made his start. About that time there was a family group just over the hills who had discovered a substance which melted under heat and hardened on being cooled down. This family found that the substance could be poured when hot into holes in the ground and thus assume interesting shapes. It could be worked into finished forms which were far superior to the stone shapes which were then fashionable. The members of this family were probably the earliest ironfounders, and as they had something better to offer than existed before, the leader of this group looked around for an opportunity to sell. He wrapped a piece of this substance in his loin cloth and set out for the nearest tribe. He arrived unheralded, weary and footsore, and by the vilest chance ran smack into the purchasing agent. He stated his case and showed his wares. The purchasing agent's eyes goggled, for even he could see the advantage in the new material, but when the founder named the price which would show a fair and reasonable profit, the agent rejected his terms.

The founder slunk out with his tail well between his legs, but he was not entirely discouraged. He had heard of the engineer, in fact, it was the engineer he had wished to see in the first place, and as he was an ingenious fellow he soon devised a means of getting his message to the engineer. He was at that time engaged on making a stone base for a new catapult which the engineer had ordered, so before he sent in the base he cut his name on it with his new material. This was the first advertisement sent through the post to a specialised buying factor. The engineer saw the message. He called in the founder and he sent for the production superintendent who was enraptured with the new material.

Engineering and production were satisfied; they agreed the price was fair, and together they went to the management and convinced them. Specifications were set up and sent to the purchasing agent who was told to buy at the agreed price.

Here is disclosed the first sale based on considerations other than cheapness—a sale which depended for its success upon appeal to engineering and production just as any quality, adaptability or workability sale must depend to-day. It would be good to stop here as the point is made, but unfortunately changes occurred and this is what happened. The original founder carried on for some time with his family but business grew and expanded so that he had to bring in strangers. These strangers learnt the business secrets and then one after another left and started foundries of their own, but instead of going farther afield for their market they sold in the established one. Their castings were not as good as those of the original founder, who had been wise enough not to divulge the particular "dope" which he kept tied round his middle and which gave his metal special properties, but the newcomers if they could not produce the quality could cut the price. One can almost hear the purchasing agent chortling with glee as he played one off against the other and obtained his requirements at a price which was no good to anyone. It was no good to the buyer because the founder had sooner or later to go out of business or cut down his quality.

These are more enlightened days, and the present-day purchasing agents are kind men who would not think of doing such a thing, but it is a personal speculation whether, when the present war is over and production outsteps demand, the terrible state of things described will not recur.

An attempt will now be made to set out how founders may plan their selling drive, and for this purpose reference will be made to those four basic principles of industrial marketing.

Finding the Market

The first principle is to locate the most profitable market. Every foundry is laid out in a particular way to suit certain types or classes of castings, and from experience the management knows the class of work which it can handle best, and the cost accounts show which type gives the biggest margin of profit. This is all wrapped up in the foundry layout, plant, capacity, floor space, labour, and other factors. Large castings may be more profitable to one foundry than small castings. The metal produced by one foundry may not be suitable for castings which have to withstand pressures. Labour in one foundry may be highly skilled and able to make intricate and high-priced castings, while in another the labour is more remunerative making machine-moulded castings.

Whatever the peculiarities are, there is generally someone in each business who knows how and on what type of casting it makes its bread and butter. Having ascertained this, the trade directory is consulted and a number of firms selected which use the class of casting that best suits the foundry conditions. Each one of these firms will use a wide variety of castings. Make a chart analysis of these firms and their requirements. Set down the items in a vertical column against the firms in a horizontal column. Some divisions of the scale will show that certain items predominate; therefore concentrate the selling drive on these.

This sounds very elementary, but it is essential as it focuses sales direction and minimises lost effort, and it also provides the basis of a definite sales approach to the customer.

Who is the Real Buyer?

Having selected the market and established the channel along which sales will operate, the next move is to determine which person is to be the objective. Who is the real buyer and why does he buy? This is quite simple if reference is made to the original four buying factors. One foundry salesman, realising that his castings are not quite up to a competitor's quality, will go all out for price as his chief talking point, and he will naturally gravitate towards the purchasing agent, where his line of reasoning will receive sympathetic consideration. Where the salesman's castings have technical advantages he will aim for the engineer, and where he can claim that his castings are correct to form with close tolerances and good machinability he will aim for the production superintendent.

Having decided on his man, how can the salesman best contact him and get under his skin without wasted time? Salesmen travelling alone meet many rebuffs, and life is hard for them. If they arrive at a works not knowing whom they want to see, their troubles begin as soon as their card is handed to the telephone operator or a youth who is generally too bored or lazy to bother to help. If the salesman can name his man so much the better, and here is where the analysis chart will help, as this information can be incorporated when the chart is being prepared.

The salesman has certain natural handicaps.

(1) He cannot make more than five effective calls per day. *Effective* calls do not include

* Paper read before the London Branch of the Institute of British Foundrymen, Mr. Barrington Hooper, C.B.E., presiding. The author is a director of Ealing Park Foundry, Limited.

those when he never gets farther than the waiting-room.

(2) He services as well as sells, and service takes time.

(3) He can be side-tracked by argument.

(4) He can be fobbed off on someone who has not the authority to close a deal.

(5) He can only be in one place at one time. He can be dismayed by the notice in most waiting-rooms, "Travellers only seen by appointment, or on Saturday afternoons."

Advertising

The problem now is how the management can help the salesman, and this brings one to the vast subject of advertising. Some humorist has said that trying to sell anything without advertising is like making eyes at a pretty girl in the black-out. It does not get anywhere. Advertising is the salesman's advance agent.

(1) It is his ground breaker and confidence builder.

(2) It makes thousands of calls which the salesman could never do.

(3) It cannot be argued with but tells its story in a simple and convincing manner.

(4) It gains admission to all important buying influences and should create the necessary interest and desire for further information in the mind of the buyer.

(5) It keeps the seller's name constantly before the buyer. In fact, it does three-fifths of the salesman's job and providing the salesman does the other two-fifths his time will be two and a half times as effective in getting orders as it would be if he were not supported by advertising matter.

Advertising to be effective must be colourful and arrest attention, and naturally to be effective it is expensive. It must, therefore, be done on a collective basis in order to spread the cost. A group of foundries operating some particular process can do this effectively without incurring great individual expense, but the author realises on the present occasion his audience includes salesmen who operate for individual foundries and in some cases are the only salesmen for a foundry, or share the London area with not more than two or three others. There are no really big jobbing foundries in this area, and there is no grouping of a nature which would make collective advertising a comparatively inexpensive matter.

Local foundries are, therefore, at a definite disadvantage in having no advance agent. Their prospects are limited to a circumscribed area and the sales target is local and stationary. Their efforts to get orders are likely to be more successful if they concentrate on service, such as collection of patterns and delivery of the castings in the quickest time. Price will also be an important factor, but the personal characteristics of the salesman and his relationship with the buyer are of first importance. The saying, "Jones has a very fine connection," aptly describes what this phase means.

The Purchasing Agent

There are various types of purchasing agents whom one meets. They include, first, that austere aloof personage with whom one can never obtain an interview. When the salesman finally does succeed, he is so shattered that he can only mumble a few formalities about his wretched castings.

Then there is the friendly type who says: "Listen, Jones, I want you to have this order; I like your castings; I like your firm; I like you, and if I had my way you would leave with the order. But if my directors heard that I had placed the business with you at this price I should get my notice. Your price is 20 per cent. higher than your competitors, and you've got to do something about it if you want the order." The salesman returns to the office to repeat the story to his foundry executive. He pleads for a reduction, and his story is so pitiful that the sales manager calls for the estimate. They both examine it closely after they have brushed away their tears, and by cutting down the moulding, core making and fettling times, they manage to knock 5 per cent. off the price. They realise this is no use, and then up looms the vision of the buyer losing his job and not being able to get another, his wife and children slowly starving. This decides them to slash the overheads. The sales manager rings up the purchasing agent and promises to meet him over the tender. The buyer says, "That's fine. Leave it with me for a day or so and I think we can do business." When nothing happens and the sales manager telephones again, he finds that the order has been placed elsewhere as his competitors have cut a further 10 per cent. off his price.

There is also the type of agent who buys only on price; no other consideration influences him. His psychology is based on making a good deal for his company, and this is his measure of success.

It might be imagined that the author has no use at all for the purchasing agent, but this is not so, as in every well-run business a buyer is an essential part of the organisation. After all, one cannot sell anything unless there is a buyer, and the purchasing agent embodies those elemental factors by which his firm is able to obtain the best value at the lowest possible cost for all the products it requires, and on that basis only can any business flourish.

(To be continued.)

Equipment and Supplies Association

ANNUAL MEETING IN LONDON

The annual meeting of the Foundry Trades' Equipment and Supplies Association was preceded by a luncheon held at the Hotel Victoria, Northumberland Avenue, London, last Thursday. This function and the subsequent meeting were presided over by Mr. G. E. France (managing director, August's, Limited). The notice convening the meeting and the minutes of the last annual meeting having been adopted, the annual report for the year ending December 31, 1939, was submitted.

The report points out initially that the period under review contained at its close the first four months of the present war, and the activities of the Association have, in consequence, been very severely curtailed.

Exhibition Policy

The chief event of the year (the report continues) was to have been the Foundry Trades' Exhibition, to be held in conjunction with the Engineering and Marine Exhibition, London, in September, but owing to the outbreak of hostilities a few days before that exhibition was due to be opened, the event had to be postponed until such time as it may be possible to hold it. The three exhibitions, namely, the Engineering and Marine Exhibition, the Foundry Trades' Exhibition and the Welding Exhibition, which were due for last September, have not been abandoned, but are merely in suspense, and it is the intention to carry out the arrangements as nearly as possible on the lines originally contemplated as soon after the end of the war as possible, so that exhibitors will then enjoy the full benefit of their contracts which have been so unfortunately interrupted.

The participation of foundry equipment interests in this exhibition are well known to have been not so great as all could have wished, and it has in the past been found exceedingly difficult to formulate an exhibition policy which commends itself to all the principal potential exhibitors, some, but not a sufficient number, feeling that a separate exhibition would have been preferable. It may be that after the interval now forcibly imposed, a greater degree of unanimity may be established in respect of post-war exhibition policy.

Apart then from encouragement which has been given to members to promote trade amongst one another, both directly and by way of introductions, the only positive achievement which can be pointed out is the action taken in respect of the Institute of British Foundrymen's Central Fund, which they collected to finance the International Convention held in June. The sum raised in previous years by the Association on behalf of all its members for handing over to the Institute of British Foundrymen was thought to be altogether too small a contribution for a year including an International Convention, and it appeared that unless this could be doubled it might be necessary to revert to the old practice whereby the Institute of British Foundrymen authorities collected individual subscriptions direct from its members. In order to avoid this, it was decided to guarantee the sum of not less than £100, to be paid by the Association to the Convention Fund, and it was sought to persuade individual members to double their own subscriptions so as to reach this total.

That effort, however, met with very little success, with the result that the difference has had to be made up out of Association funds. Whilst it is regretted that it was necessary to make this incursion upon the reserve, it is felt that the action was justified, not only in order to maintain the principle of a joint contribution, but also as a gesture of great importance by the Association to the Institute coming at a very opportune time. It is of the greatest importance that the friendliest possible relations between the two bodies be perpetuated and extended.

The membership of the Association stood at the closing date of the report as one less than at the end of 1938, and now numbers 19. Apart from the observations made above regarding the Institute of British Foundrymen's Fund, the accounts themselves would appear to call for no comment.

The report concludes with the observation that it had been written in a period of very great confusion arising out of incidents of the war. Trading generally, and more especially that with Government Departments and under Government control, is in process of undergoing extensive readjustments, and it may be some months yet before it is possible to settle down to new conditions. During that period it is the intention of the Association to bring its activities wherever possible before the competent authorities, in order that it and the interests it represents and, indeed, those of all individual members concerned, shall be consulted to the utmost possible extent. For this reason it is hoped that during 1940 the membership may be fully maintained and, if possible, enlarged, and that by the time the next annual report comes to be written a brighter and more satisfactory state of affairs all round will be able to be recorded.

The report is signed by Mr. G. E. France, the President, and Mr. K. W. Bridges, the hon. secretary.

The balance sheet showed cash resources amounting to £331 12s. 4d., and the income and expenditure accounts showed a loss on the year's working of £45 14s. 3d.

Election of Officers

The report and balance sheet having been approved, and the usual routine business transacted, the meeting proceeded to the election of officers for the current year. Mr. G. E. France was re-elected President and chairman of the Council, and Mr. E. J. Penstone (Atlas Preservative) Vice-President. The Council was re-elected *en bloc*. A sub-committee, consisting of the President, Mr. D. Cherry Paterson, and Mr. Barrington Hooper, C.B.E., was formed to consider means of extending the scope and usefulness of the Association.

Development of Steel-Foundry Production Methods

GREEN-SAND MOULDING APPLICATIONS

In spite of the fact that there was little or no attendance of members from Newcastle, the meeting arranged by the Middlesbrough Branch of the Institute of British Foundrymen at Darlington was very well attended. The lecturer was Dr. C. J. Dadswell (steel-foundry manager, English Steel Corporation) and he took for his subject the developments which have recently taken place in the production methods within the steel-foundry industry.

Some of the reasons related to less incentive for intensive production in this country due to smaller markets and the questions of availability of labour, difference in training of executives and different classes of raw materials, particularly for moulding.

Not only had the methods of production from the point of view of productive capacity or output per unit area of the steel foundries improved, but also there had been an improvement from the point of view of technique which was applicable both to machine moulding and hand moulding for jobbing work. One could refer to the problems of technique that had been created in the manufacture of the engineering industry. The steel castings for the Cunarder, "Queen Mary," the largest ship castings in the world, had been made locally, and in his own case recently the steel castings had been made for a press which were both the longest and heaviest steel castings ever made in this country.

Some of the improvements in equipment and technique could be summarised by the following numbered paragraphs, which would give a picture of the developments that had taken place.

(1) The extended use of moulding machines of a better quality and better suited for increased production. Such machines had enabled not only the ramming to take place mechanically but also the stripping of the moulds with reliability and accuracy.

(2) The use of sand conveyors and sand preparation plant to some extent in nearly every foundry. The types of conveyors and the machines for sand preparation had become simpler and more robust so that their maintenance was now very small and therefore their utility very much greater than a few years ago.

(3) Control of the sand preparation by simple but more or less scientific laboratory testing. This was coupled with a greater understanding of the sand problem generally and a more searching inquiry into the unsolved problems as they stood at the present moment.

(4) A more scientific outlook was gradually being held by those in control, who tended to search more diligently for the reasons why things happened. Any reasonable theory developed to explain an occurrence in the foundry,

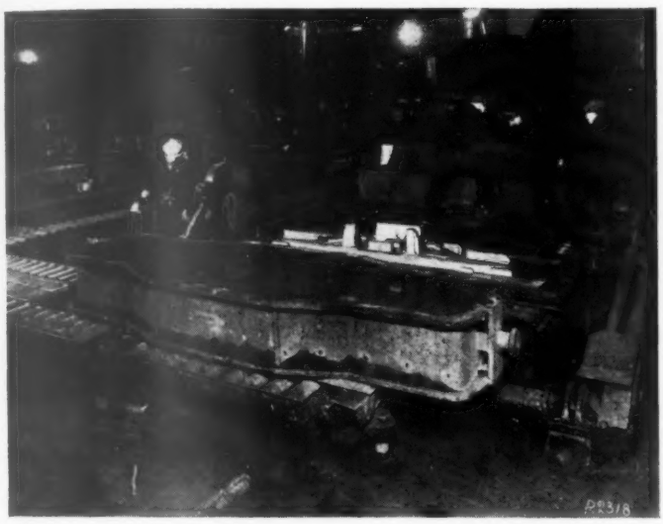

Fig. 1.—Green-Sand Moulding of Castings up to 1 Ton.

Fig. 2.—Machine Moulding Bay as Devoted to Dry-Sand Work.

In a brief introduction the author explained that he would deal particularly with the application of green-sand moulding for steel castings weighing from a few pounds up to over a ton. Steel-foundry production methods in this country had undergone considerable changes during the last ten years, for reasons which he had given at greater length in a previous Paper.*

* "Comparison between American and English Steel-Foundry Practice," International Foundry Congress, London, June, 1939.

Fig. 3.—The Bay shown in Fig. 2, photographed Five Years Later, after Equipping it for the Production of Steel Castings in Green Sand.

Fig. 4.—For Shot-Blasting Steel Castings this Plant embodies a Centrifugal Projection Wheelabrator Unit and a Manually-Operated Compressed-Air Blasting Chamber for Finishing on a Large Rotary Table.

D

although only partially correct fundamentally, often helped to solve a problem because it led to further logical thinking and deduction.

(5) Improvements in steel melting, particularly with electric furnaces. Ten or fifteen years ago, electric furnaces were often operated by people who could make good steel for ingots, but not such good steel when poured into moulds. After much recrimination between steel melter and moulder, followed later by more scientific investigations, it had become possible to make good electric steel for castings.

(6) Improvements in heat-treatment and an insistence that all castings should be annealed. It was not many years ago when every steel foundry did not anneal all castings. It was now

Fig. 5.—Mould for Heaviest Steel Casting Made in England.

exceptional to find a casting which was not heat-treated in some form or other.

(7) The gradual extension of green sand and skin-drying in moulding. Nearly every one of the half-dozen points already mentioned had had a bearing on this development and had made green-sand moulding possible. Machine moulding had given consistency in ramming and stripping had saved mending of moulds. Sand control had meant consistency of moulding sand where moisture and permeability were particularly important. Sand handling had enabled the green sand to be particularly appreciated for mass production, and finally (but not at all least) the improvement of steel melting mentioned had meant that steel could be poured into moulds in which steam would be present, without ill-effect.

(8) The application of green sand causing more rapid outputs had meant a tendency for the foundrymen to become more production-minded, leading to greater accuracy, less wasted movement and improved lay-outs for the transport of material in the foundry.

Green-Sand Work and Floor Economy

After these remarks, the author showed some three dozen slides, the first two dozen being devoted to plant and equipment which indicated how green-sand production was arranged in the foundry under his charge. He illustrated three lay-outs, one for small castings up to ½ cwt., the second for making castings up to about 5 cwts., and the third, which is unique, for castings in green sand up to about 1 ton and skin-dried up to several tons. This last lay-out (shown in Fig. 1) was conceived primarily for the manufacture of cast-steel side frames and bolsters, but specially designed so that it could be used for series production on a small scale with frequent pattern changes during the day.

In every case it was evident that the study made of the lay-outs had enabled green-sand moulding to show to best advantage. Most of the handling of moulds and boxes was done by gravity roller conveyors and jib cranes and the sand preparation was continuous and automatic. This method of moulding enabled the biggest output to be obtained from a small space and a minimum of moulding boxes. This point was illustrated in the pictures of the moulding bays before and after the introduction of green-sand equipment (Figs. 2 and 3). Slides of American foundries doing similar work were also shown for the sake of comparison.

The author said he could not come to Darlington without showing some sense of rivalry, and he exhibited a few slides of large castings which had been made in the foundry with which he was connected. He pointed out, however, that actually there was no direct comparison between the castings in question and those of Darlington, as each district had developed its own speciality, that of Darlington being in particular ships' castings, whereas the heavier castings in Sheffield were for engineering work, the heaviest being for presses and rolling mills.

One of the reasons why Sheffield made the heaviest castings in the country was that the foundry was alongside the steel-melting department for the heavy forges and thus had large quantities of steel available from the united capacities of large open-hearth furnaces. Amongst the illustrations shown were some relating to the longest and heaviest steel casting which had been made in this country; it weighed 120 tons and was 33 ft. long (Figs. 5 and 6). He also showed several other slides of a similar nature and then what was probably the largest core made on a barrel for a steel casting (Fig. 7).

One of the developments which had taken place in this country was the use of electric arc heating on feeder heads for large castings. Examples of castings which had been treated in this manner were given.

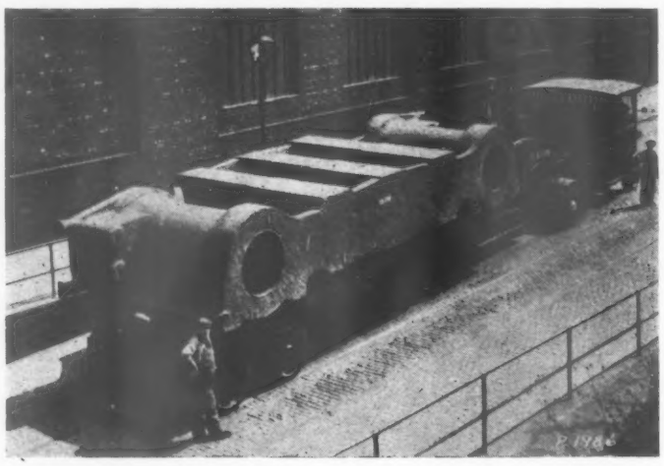

Fig. 6.—Steel Casting weighing 120 tons, 33 ft. long, leaving the Works.

Fig. 7.—Outsize Core Barrel for Steel Casting, 25 ft. long, 5 ft. 6 in. dia.

DISCUSSION

Mr. W. D. Pugh opened the discussion by thanking Dr. Dadswell for his lecture and pointing out that a further development which he thought was important and which had not been mentioned was that of the increased use of alloy steel castings. He also asked what was the maximum safe size that one could make steel castings in green sand, and he inquired what the output per unit area of floor space would be. He finally asked if a reason could be given for the choice of the electric furnace for the small green-sand castings referred to in the slides as against the use of a converter.

Dr. Dadswell replied that he certainly should have mentioned alloy steel castings. In the United States of America during the depression of a few years ago, a concentrated drive on the part of the steel foundries enabled them to recapture certain markets from drop stamping by the development of alloy steel castings.

It was not easy to say what was the maximum safe size in terms of weight for green sand, as it rather depended on the metal thicknesses, but he made, continually, castings weighing up to a ton in green sand and up to several tons in skin-dried sands. He had no figures with him as to actual output per unit of floor area for green sand, and they would require working out, but after a mental calculation it would appear that one could expect, say, for the small unit in his own foundry, an output of castings (each weighing, say, 30 lbs.) of 1 ton per hr. for 3,000 sq. ft. of floor area.

In their own case, the electric furnace was chosen for the small moulding unit to give frequent casts of steel, as an average of 1 ton per hr. only was required, and the small 2-ton furnace installed took far less room than the equivalent converter unit would have taken even if it had been economical at such a size.

Mr. F. Swift asked whether the author, in his travels in foundries on the Continent and in America, was of the opinion that the craftsmanship was as good in foreign countries as in this

(*Continued on page* 280.)

Improvements in Radiation Furnaces*

By R. GERMAIN

Bronze Melting

Radiation furnaces were first installed for the melting of cast iron and were of small capacity, but the results obtained from these early plants were truly remarkable. Their application has since been extended to embrace copper alloys and special steels. The first radiation furnaces for the melting of bronzes were installed in England in 1937, and were generally similar in design to those utilised for cast iron, that is they were of the barrel type with a central resistor. It should be understood that power applied for the same hearth capacity is materially less. The study of reliability in this direction is well advanced. The first trials indicated perfect atmospheric neutrality in relation to the metal melted. Compositions of the most easily oxidisable alloys could be made up, and this with a maximum of economy.

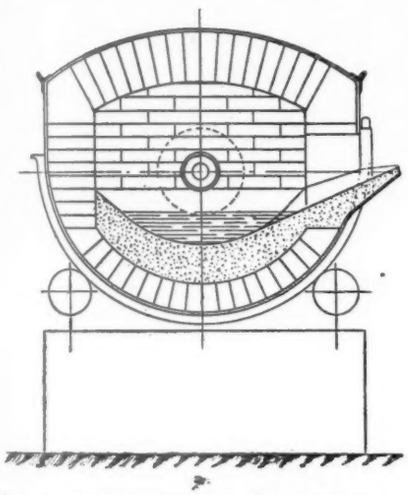

FIG. 1.—DIAGRAM SHOWING CONSTRUCTION OF RADIATION FURNACE.

Also during 1937, a furnace of the same type having a capacity of 4 cwts. was installed at Amsterdam for melting electrolytic copper. In 1938, a furnace of 6 cwts. was started up in the Paris district for melting special bronzes, a second furnace being added during May of that year. Several additional furnaces of this type and for this purpose are now either being erected or are on the stocks.

The average consumptions as related to a 6-cwt. furnace for melting 87.5:12 bronze with 0.5 per cent. of P are as follow:—Current, 310 kw.-hrs. per ton; graphite, 2.75 lbs. per ton, and refractories, 8.8 lbs. per ton.

The last lining to be installed gave a life of 1,015 casts, whilst the metallic losses were of the order of 0.6 per cent. The phosphorus content was definitely unchanged during melting. The above consumptions relate to an output of five casts per day.

Steel-Melting Plants

During 1938, the Fenwick concern perfected its first steel-melting furnace of large capacity. They manufactured a 2-ton furnace for the purpose of making a special high-chromium heat-resisting alloy to be cast into moulds at 1,700 deg. C. It is now installed in a steelworks in the east of France. Some details of the new design are shown diagrammatically in Figs. 1 and 2. This new furnace makes three casts per day, and for the first cast it consumes 1,000 to 1,100 kw.-hrs. per ton; for the second 850 to 900 and for the third 750 to 760 kw.-hrs. per ton. The figures are average ones, and the lowest registered is 580 kw.-hrs. per ton. The furnace is semi-rotary, and carries a separate roof and hearth. The roof is made of chrome-magnesite specially-shaped bricks, and is independent. Its curvature is such that the rays emitted by the resistor are properly reflected to the bath.

The walls are also of chrome-magnesite bricks, and the last campaign gave a life of 414 casts without rebuilding of either the roof or the walls. The hearth is made of a slightly basic mixture (magnesite-chrome-corindon) and is easy to fettle. During melting, the bath remaining slag-free, the carbon content is virtually unaltered and is controlled to ± 0.04 per cent. The loss in other elements is of the order of analytical error.

The elasticity of this furnace is noteworthy as one can work equally well with charges of 7 or even 5 cwts. without materially altering the efficiency of the furnace, or without injuring the refractory lining and without increasing the tonnage current consumption. It might be said that it behaves like a perfect crucible. It is to be recorded that an identical furnace with three resistors is now under construction.

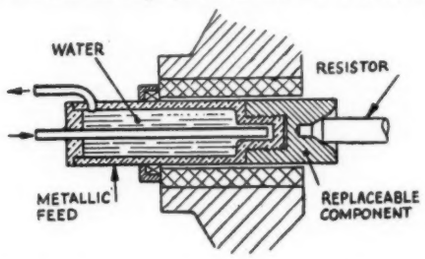

FIG. 2.—ARRANGEMENT FOR FEEDING OF CURRENT TO FURNACE.

Recent Improvements

Parallel with the improvement noted of these new applications there have been considerable modifications made to the earlier radiation furnaces. The barrel-shaped furnace has virtually remained unchanged as to the shape of the body and lining, but the feed for the electric circuit has been completely changed. The two ends of the furnace are now symmetrical, and each carries a special water-cooled casting for feeding the current to the furnace. It is shown in Fig. 2. It is closed by a metal nipple, also water cooled, which receives a replaceable graphite component for carrying the extremity of the resistor.

The dismantling of these current feed castings is instantaneous and the point of entry of these feeds in the furnace is cold, which allows of the placing at each end of the furnace of definitely water-tight stuffing-boxes. The resistor slides into the replaceable components so that in case of accidental breakage the ends remain in place and cannot fall into the bath. The total consumption of graphite has by means of this modification been reduced by 60 per cent.

There are four furnaces of 3-cwt. capacity provided with this system actually in service at the works of the Mancelle Foundry at Le Mans. These furnaces are used for melting metal for wear-resisting irons (brakeshoes). For this special application and the melting of brake-drum metal, quite a large number of French and foreign manufacturers have adopted the radiation furnace (Bollée, Rouge, Riv-Fiat, Gnome and Rhone, Monopole, etc.).

Duplexing

The radiation furnace lends itself equally well to the compositional adjustment of liquid metals by duplexing, and two 32-cwt. furnaces have been installed in the works of the Fonderie des Ardennes at Mézières, which operate on solid charges as well as duplexing.

When duplexing, these furnaces generally operate on metal for making pearlitic irons. The cupola-melted iron is desulphurised in the ladle during its transfer to the electric furnace, charging being effected through the working door, whilst the resistor remains in position. Charging being accomplished, a sample is immediately drawn for analysis whilst the metal is being superheated. The total time for this operation is from 30 to 45 mins.; it includes superheating and the melting of the necessary additions consequent upon the laboratory report. The consumption for metal cast at from 1,450 to 1,500 deg. C. when working duplex is of the order of 200 to 250 kw.-hrs. per ton.

The same furnaces allow of the manufacture of synthetic irons, the charge consisting of steel turnings of known composition and carbon in the form of petroleum coke. The loss in carbon is only 4.4 per cent. [This figure will depend upon the surface condition of the turnings.—EDITOR.] The results obtained when making pearlitic irons in the radiation furnace show the graphite to exist as fine lamellae with a well-defined grain structure. The pearlite is extremely fine and homogeneous, and the iron possesses the following mechanical properties: Brinell hardness, 230 to 250; transverse strength (using a 40 by 18 by 8 mm. test-piece with 30 mm. between supports), 1,540 lbs. load; deflection, 0.25 mm.

Conclusions

The radiation furnace has now established itself as a regular type of electric melting plant, the method of heating and the nature of the furnace atmosphere making it an ideal crucible. Now that it is a practical proposition, because of its low initial and operating costs, it has been adopted by manufacturers of refined or special metals, as it gives a positive control when working on varied outputs. It makes a special appeal to the average size of works.

* Translated from "Journal du Four Electrique et des Industries Electrochimiques," Vol. 48, No. 7.

Malleable Cast Iron

A letter from Mr. H. G. Hall, author of the Paper bearing this title which appeared in our issues of March 21 and 28, expresses appreciation of the way in which the Paper had been edited for publication and the excellent reproduction of the photomicrographs. There were, Mr. Hall adds, a few errors, probably due to bad handwriting. These are, in order of importance:—The title under Fig. 16 should be "Brinell Hardness of Iron shown in Fig. 13," and the last sentence at the bottom of column 1, page 237, should then read, "The Brinell hardness of the above type of metal is shown in Fig. 16." The second sentence in column 1, page 228, should read, "On the other hand, an oxidising atmosphere at point 1 (Fig. 1) would rarely be detrimental as diffusion would cancel out oxidation." In the third column, page 226, in the seventh line from the bottom, it should be "poor" and not "pure" annealing technique. Finally, the 12th line, column 3, page 223, should read, "decomposed to nodules of graphite and alpha ferrite."

THE SWEDISH STATE RAILWAYS' BOARD has requested authority to allocate 24,870,000 cr. from the renewal fund during 1940 for the purchase of railway track material and rolling stock equipment.

Iron and Steel Institute

ANNUAL MEETING IN LONDON

The Annual Meeting of the Institute will take place at the offices of the Institute, 4, Grosvenor Gardens, London, S.W.1, on Thursday and Friday, May 2 and 3, 1940, commencing each day at 10 a.m.

Non-members of the Institute will be welcome, but in order to meet the wishes of the Press and Censorship Bureau it will be necessary for them to bring with them a letter of introduction signed by a member of the Institute. Both members and non-members will be requested to sign a declaration on entering the meeting room that they will treat the proceedings as strictly confidential.

Air-raid shelter accommodation will be available in surface shelters in the gardens immediately outside the main entrance to the Institute's offices.

A luncheon for members will be held at Grosvenor House, Park Lane, London, W.1, on Friday, May 3, at 1 p.m.

Programme of Proceedings

Thursday, May 2.—10 a.m.—General meeting of members. Presentation of annual report and statement of accounts for 1939; election of new members and associates; induction of the newly-elected President, Mr. John Craig, C.B.E., into the chair. Mr. Craig, who is chairman and managing director of Colvilles, Limited, has been elected President of the Institute for the next two years. He will be inducted by the retiring President, the Right Hon. the Earl of Dudley, M.C.

Announcement of the election of Monsieur Eugène Schneider, D.Sc., to honorary membership. Monsieur Schneider has been nominated an honorary member to celebrate the fiftieth anniversary of his election to membership. M. Schneider joined the Institute in 1890, he became a Member of Council in 1905 and was President for the period 1918-1920. In 1930, the Bessemer gold medal was awarded to him. Had it not been for the outbreak of war, the Autumn Meeting of the Institute this year would have taken place in France, and M. Schneider took a leading part in the preliminary discussions of the arrangements.

Presentation of the Bessemer gold medal for 1940 to Dr. Andrew McCance of Glasgow. The medal has been awarded to Dr. McCance in recognition of his eminent services in the application of science to the iron and steel industry. He is a director and general manager of Colvilles, Limited.

Presentation of the Williams Prize for 1939 jointly to Mr. W. B. Lawrie, for his Paper on "The Refining of Metal in the Basic Open-Hearth Furnace. The Influence of Fluorspar on the Process," and Mr. W. T. Wilson, for his Paper on "The Rolling of Sections at the Appleby-Frodingham Steel Company, Limited," These Papers were printed in the No. 1 volume of the "Journal of the Iron and Steel Institute" for 1939, pp. 257P and 321P, respectively.

Presentation of the Andrew Carnegie silver medal for 1939 to Mr. Bo O. W. L. Ljunggren. Announcement concerning the Ablett Prize for 1940 (see third column). Presidential Address.

Presentation of the following Papers for discussion:—

"Researches into the Structure of Alloys," by A. J. Bradley, F.R.S., W. L. Bragg, F.R.S. and C. Sykes.

"Manufacture of Pig-iron in America," by Wm. A. Haven.

Afternoon Session at 2.30 *p.m.*

Presentation of the following Papers for discussion:—

"Report on Corrosion Research Work at Cambridge University Interrupted by the Outbreak of War," by U. R. Evans. (Paper No. 1/1940 of the Corrosion Committee.)

"The Damping Capacity of Steel and Its Measurement," by G. P. Contractor and F. C. Thompson. (Paper No. 1/1940 of the Alloy Steels Research Committee.)

"The Estimation of Hydrogen in Steel and other Metals," by W. C. Newell. (Paper No. 1/1940 of the Oxygen Sub-Committee of the Heterogeneity of Steel Ingots Committee.)

Friday, May 3

10 a.m.—Continuation of General Meeting.

Presentation of the following Papers for discussion:—

"Anti-Piping Compounds and their Influence on Major Segregation in Steel Ingots," by E. Gregory. (Paper No. 1/1940 of the Committee on the Heterogeneity of Steel Ingots.)

"Heat Transfer in the Flow of Gas through the Interstices of a Bed of Solid Particles," by O. A. Saunders and H. Ford.

"Method of Sclero-Grating Employed for the Study of Grain Boundaries and of Nitrided Cases: Grain Structures Revealed by Cutting," by Bo O. W. L. Ljunggren. (Andrew Carnegie Research Report.)

Members' Luncheon

The Council have decided that, in the present circumstances, the annual dinner of the Institute shall not be held this year. Instead, a members' luncheon will be held at Grosvenor House, Park Lane, London, on Friday, May 3, 1940, at 1 p.m. Application for tickets (price 10s. each, exclusive of wine) should be made not later than April 26.

Papers to be Included in the No. 1 Volume of the Journal for 1940

The following is a complete list of Papers which will be included in the No. 1 volume of the "Journal of the Iron and Steel Institute" for 1940:—

(*a*) Wm. A. Haven: "Manufacture of Pig-iron in America."

(*b*) E. Gregory: "Anti-Piping Compounds and their Influence on Major Segregation in Steel Ingots."

(*c*) H. Lepp: "The Oxygen/Hydrogen/Molten-Iron System."

(*d*) U. R. Evans: "Report on Corrosion Research Work at Cambridge University Interrupted by the Outbreak of War."

(*e*) Bo O. W. L. Ljunggren: "Method of Sclero-Grating Employed for the Study of Grain Boundaries and of Nitrided Cases: Grain Structures Revealed by Cutting." (The author of this Paper receives the Andrew Carnegie silver medal for 1939.)

(*f*) A. J. Bradley, F.R.S., W. L. Bragg, F.R.S. and C. Sykes: "Researches into the Structure of Alloys."

(*g*) G. P. Contractor and F. C. Thompson: "The Damping Capacity of Steel and Its Measurement." (Paper No. 1/1940 of the Alloy Steels Research Committee.)

(*h*) W. C. Newell: "The Estimation of Hydrogen in Steel and other Metals." (Paper No. 1/1940 of the Oxygen Sub-Committee of the Heterogeneity of Steel Ingots Committee.)

(*i*) O. A. Saunders and H. Ford: "Heat Transfer in the Flow of Gas through the Interstices of a Bed of Solid Particles."

In order to conserve paper, members are earnestly requested not to ask without special reason for further copies of Papers that they have already received. Members attending the meeting should bring their Papers with them, as additional copies will not be available.

Prizes and Research Grants

The attention of members is specially directed to the following prizes and research grants which are awarded at the discretion of the Council of the Institute. It should be particularly noted that these are also open to non-members, and members will greatly assist the Council by making these prizes and research grants known among their friends.

Ablett Prize

Members will remember that the Council had accepted an offer from Capt. C. A. Ablett, O.B.E., B.Sc., M.Inst.C.E., to present a prize of £50 for the best Paper on a subject connected with engineering in iron or steel works submitted to the Institute for presentation at the present Annual General Meeting, written by a junior engineer, irrespective of whether or not he is a member of the Institute, the conditions being that the author of the Paper shall be a British subject employed in Great Britain or the British Empire, that he shall be under 35 years of age and that he shall hold a position not higher than that of a Departmental Engineer.

It is with regret that the Council announce that no Papers have been submitted in competition for this prize; this is, no doubt, due to the prevailing war conditions and the resulting pressure of work. The Council are pleased to state, however, that Capt. Ablett has agreed to re-offer the prize for competition by Papers submitted for the annual meeting in 1941 and they have gladly accepted his offer.

Competing Papers should be marked "Ablett Prize Paper" and sent to the Secretary of the Iron and Steel Institute, 4, Grosvenor Gardens, London, S.W.1, as soon as possible and in any case not later than January 31, 1941.

The successful Paper will be presented at the Annual Meeting, 1941, and published in the Journal of the Institute. The Council may agree to publish more than one of the Papers submitted.

The Ablett prize for 1939 was awarded to Mr. H. Escher, of Port Kembla, N.S.W., Australia, for his Paper on "Ten Years' Development in Steam Engineering at the Port Kembla Steelworks, N.S.W., Australia."

Williams Prize

The Williams Prize to the value of £100 is presented annually, subject to the discretion of the Council, to the author of a Paper of a practical character adjudged by them to be the best Paper of that type presented to the Institute and accepted for publication during the year, the conditions being that the author of the Paper shall be a British subject regularly employed in a British iron or steel works, and that at the time of presenting the Paper he shall be employed in such works in a position not superior to that of manager of any one technical department.

Andrew Carnegie Research Grants

Andrew Carnegie Scholarships, usually to the value of £50 or £100, are awarded annually by the Council of the Iron and Steel Institute in order to assist those engaged in research, irrespective of sex or nationality. Candidates must be under 35 years of age. Applications should be made on forms which will be supplied by the Secretary of the Institute and should be submitted not later than May 31 or September 30 in each year.

The results of researches in respect of these awards are to be communicated to the Iron and Steel Institute in the form of a report for publication, and the Andrew Carnegie Gold (or Silver) Medal may be awarded to the author of the report which, in the opinion of the Council, is the most meritorious of the year.

The Hermann Göring Steelworks at Brunswick and Linz

SCHEME TO DEVELOP STEEL INDUSTRY IN STRATEGIC POSITION REMOVED FROM THE RUHR

The new Hermann Göring steelworks at Brunswick and Linz, in central Germany, decided upon in 1937 under the Four-Year Plan, have excited much curiosity as to the extent of the undertaking. A certain amount of information became available from time to time, but, so far as we are aware, it was only recently that full details of these works were published as part of a Paper entitled "Some Recent Developments in the Iron and Steel Industry of European Countries," read by MR. H. A. BRASSERT, the consulting engineer and designer, before the Eastern States and Chicago District Coke Oven and Blast Furnace Associations, Cleveland, and published in "Blast Furnace and Steel Plant." The following extracts give a fair idea of this scheme, which was initiated partly to utilise home ores and secure greater independence of external supplies, but mainly to develop an important section of Germany's steel industry away from the vulnerable Ruhr area.

The German government decided in 1937 that the domestic, low-grade ores must be extensively worked and new steel plants erected in the centre of Germany on the Salzgitter ore deposits and also on those of Baden and Bavaria away from the congested Ruhr district. The industrial leaders of the Ruhr declined to proceed, especially on the Salzgitter ores, stating that it was impossible to produce pig-iron and steel economically, if at all, from 100 per cent. of these siliceous high-sulphur ores.

Having heard about the success at Corby with similar high-sulphur low-grade ores, the government gave the author the commission in 1937 to build in the Brunswick district the world's most up-to-date plant for a production of 1,000,000 tons of steel per year immediately and to be extended in four equal steps to 4,000,000 tons. Construction of the first division was started as soon as the site was selected, including harbour, ore-preparation plant, by-product coke plant, blast furnaces, steelworks, rolling mills and power plant. Early in 1938 the order was also received to build the plant at Linz having 1,000,000 tons of ingot capacity, comprising harbour, coke plant, blast furnaces, steelworks, rolling mills and power plant. Soon thereafter instructions were received to proceed with the second, somewhat larger unit at the Brunswick plant extending the steelworks' capacity of the first two units to 2,500,000 tons and adding a continuous 100-in. strip mill. Since the breaking out of hostilities, the construction of these plants has been taken over by the government.

MAP OF GERMANY SHOWING PRINCIPAL OREFIELDS AND LOCATION OF THE NEW WORKS AT BRUNSWICK AND LINZ.

1—Siegen orefield, with iron spar containing 5.7 to 7.6 per cent. Mn; estimated reserves, 110 million tons. 2—Styrian "Iron Mountain." 3—Lahn-Dill orefield, with reserves of 60 million tons of red ironstone. 4—Ilsede-Salzgitter brown ores, with reserves of about 250 million tons. 5—Amberg-Sulzbach brown ores, with reserves of 23 million tons. 6—Wurtemburg Dogger ores. 7—Vogelsberg brown ores. 8—Schmiedefeld iron silicates, with reserves of 30 million tons. 9—Lindener Mark manganiferous ores.

BRUNSWICK PLANT

The canal or harbour for the Brunswick plant was located near the long eastern edge of a site which is over four miles long and about two miles wide. The railroads were laid out to bring in the raw materials from the south on high lines and to deliver the products to the north on yard-level lines running the length of the site, parallel to the harbour. Very extensive yards were provided at either end to assemble the raw materials as well as finished products. Movements on yard level tracks and high lines were all arranged on the uniflow principle. Two wide concrete high roads were designed to straddle the whole of the plant transversely to the railways, one between the first and second and one between the third and fourth plant groups. From these overhead highways concrete ramps led into each department. Thus all grade crossings of active railway lines were avoided for motor truck, passenger car traffic, as well as for workmen coming in and going out of the plant. Some 12,000 workmen were engaged in construction of this plant, nearly half of them being foreigners who had come from nearly every neighbouring country.

Coking Plant

The branch canal connecting the Brunswick plant with the Midland Canal system was brought in from the north and runs through the site at double width, to serve as harbour with a coal unloading and storage dock extending along its eastern front and iron ore and slag loading dock on its western side. Parallel to the coal dock are the coal pulverising and mixing stations, serving two groups of four batteries of 55 ovens or 220 ovens, of 1,750,000 tons annual coal capacity or 1,250,000 tons of annual coke production. In the second group of 220 ovens a complete coal-testing plant of four normal ovens, coal-preparing equipment and by-product plant have been added. The by-product departments are on the coal side of the plant with the by-product plant in two separate units, but combined in one to serve the two coke plant units for 3,500,000 tons of coal or 2,500,000 tons of coke. The plant is laid out for two additional units or sixteen coke-oven batteries in all. Eight batteries are now being installed in which the latest Becker, Koppers, Otto and Still types are included.

There are eight 1,000-ton proportioning bins located after the pulverisers. It is expected that the plant will receive about 36 different kinds of washed coal from the Ruhr collieries through the Westphalian Coal Syndicate. These, by their different physical and chemical characteristics, will be grouped as closely as possible into not more than eight different classes.

Seventy-five per cent. of the total gas will be compressed and purified for distribution to steel heating and treating furnaces as well as to outside industries and communities. The pipe lines will reach as far as the city of Berlin, some 150 miles distant. A new feature in this connection is the oxide purification by means of the Lentz process, including the recovery of the sulphur by means of carbon bisulphide (CS_2).

Blast-Furnace Plant

Whereas the coke plants lie parallel to the canal and the main through tracks of the plant railways, the blast-furnace plants, steelworks and rolling-mill groups have been put at an angle of about 35 degrees or the best angle from the standpoint of heavy transport. There are four blast-furnace groups of eight furnaces each, the first one of which was nearly completed, and the second group with eight larger furnaces being under construction. From the ore preparation plant, which lies to the south of the blast furnaces, two high-lines come in,

which serve the coke and ore bins of eight furnaces four in a row, with an ore yard between them. Each four-furnace line has its own gas-cleaning, steam, water and blowing plant. The gas for the first eight-furnace group is dry cleaned in whirlers followed by wet towers, low-powered disintegrators and two-stage wet Cottrell finishing plant. The disintegrators were installed on account of the uncertainty about the quality of the gas from the Salzgitter ores which, like the Corby ores, are high in alkali content. Linz and the second group of furnaces at Brunswick will have no disintegrators.

The blast furnaces are designed along the lines of the Corby furnaces, taking into account the still lower specific gravity of the powdery fines released from the Salzgitter ores upon dehydration and calcination in the furnace, which, as at Corby, will be one of the chief difficulties in the operation. The wear on the linings also was considered in view of the large amount of ore and sinter per ton of iron (around 3½ tons) and at least 1½ tons of slag. The linings were therefore protected up to the stock-line with vertical cooling plates and the tops flared out to reduce the speed of the gases. The uptakes join above the furnace top and a single downcomer placed opposite the skip carries the gas into the top of the dust-catcher. This stabilises the high furnace construction.

Each furnace has three 22-ft. by 100-ft. hot-blast stoves of the zoned filler type, and one furnace in the second group was to be equipped with a double-compartment recuperator. The steam for each eight-furnace group is raised in two stations, one for each group of four furnaces. The boilers are of the B. & W. type and carry 600 lbs. steam pressure. The two boiler plants are connected to each other as well as to the large power plant. The fuel is fine cleaned blast-furnace gas. The turbo-blowers for the first furnace group are designed for 25 lbs. maximum blast pressure and those for the second group for 30 lbs. All the water is cooled in large conical towers and recirculated. The track layout of the furnaces and each four-furnace group is laid out in a straight line, with the slag tracks on one side and the iron tracks on the other. Special slag-handling facilities have been provided to take care of the unusually large amount of slag. For this reason two slag notches were provided as well as equipment for running both hot and granulating, which can be done into cars or pits located at one end of the furnace group with provision of special means to avoid the steam nuisance. The furnace columns are placed on a slant, corresponding to the batter of the shell and inwall lining, so as to leave room for future increases in the hearth diameter.

Ore Preparation

The ore-preparation plant is located beyond the end of the canal and beyond the power plant on the opposite side of the main four-line elevated highway which connects the new Hermann Göring town with the four-lane highway running from Berlin westward to Hannover, the Ruhr district and Cologne. Railroads on the plant level as well as the high lines, and local concrete roads, run under this great highway on three grades. The ore-preparation plant is fed from a high line coming from the central ore-shipping station at the mines. The 60-ton ore cars are unloaded directly from this high line into the main crusher bins, whence the ore is carried on belts to the secondary crushers and then to the screening and grading plant. Three ore grades are made according to size, and each size is conveyed to its own set of Robins-Messiter mixing piles. The mixing piles are provided with protection against severe winter weather.

The coarsest grade reclaimed from the piles (¼ in. to 2 in.) goes directly to the transfer cars for the blast-furnace high lines. The medium size (¼ in. to ¾ in.) can go directly to the furnaces, or any portion can be recrushed for sintering. The fines (below ¼ in.) go either directly to the sintering plant or those from the most siliceous ores are concentrated by the Lurgi process. This consists of rotary kilns in which the ores are made magnetic by heating with blast-furnace gas and then pulverised and passed over magnetic separators, whence they go to the sintering plant, there joining and mixing with the stream of fines coming directly from the mixing piles.

The installation of a Krupp "Renn" process plant was also provided adjoining the sintering plant, not to supply the Brunswick furnaces, but for shipment of ore in its highest possible form of concentration by canal to the Ruhr plants.

Steel Plant

The angular disposition of the blast-furnace and steel plants to the through tracks permits molten iron to be taken with equal ease of transport from any of the 32 blast furnaces to the mixers of any of the steelworks, present and future. The first steelworks unit for the production of 2,500,000 tons of ingots consists of three 1,200-ton mixers, five 60-ton converters and six 120-ton tilting open-hearth furnaces (equalling 150 tons capacity according to American standards). This is the largest steel capacity which has ever been housed in a single unit, such concentration being possible only with the basic-Bessemer process. It includes many innovations; for instance, the converters are of a new shape, being spherical instead of cylindrical, designed for a shallow bath in spite of large capacity and having a much greater volume for the molten metal in the annular space around the tuyere area than ever provided before for free recirculation of the metal during the blow. The vessels are equipped with a new type of hydraulic control for rapid and accurate tilting. The converter chimneys are of great depth and are to be provided with covers and means to do away with the smoke nuisance. The lime is charged from the top by means of a special crane.

Scrap is charged from the rear platform and special facilities are provided to bring it in hot from the blooming and slab mill shears. With the large spherical converters, it is expected that most of the scrap made at these points can be remelted in the basic-Bessemer department without consuming heat for melting in the open-hearth. The converters are served by heavy ladle cars which carry the tapping ladles and run on a broad-gauge track parallel to the converter row and deliver the ladle to the casting stands, where the casting is done on cars. The filled moulds are carried to the stripper building, which is located parallel to the soaking-pit building, the transfer from one to the other being made by means of a rotating table, the centre of which is on the centre line between the two buildings. This arrangement permits of the highest speed in this operation. The pits are of the circular type, tangentially fired with blast-furnace gas and equipped with double recuperation. Steel tubes are used for the blast-furnace gas, and metal sheets for the air.

Rolling-Mill Plant

The 46-in. blooming mill is one of the heaviest and fastest yet constructed, and resembles the latest type of blooming mills which have been installed in the United States. It is followed by a 32-in. reversing mill, and a 26-in. continuous mill, in which all stands are individually driven, and every other stand is a vertical stand, but driven with the same size motor as the horizontal stands. The vertical stands therefore perform the same work as the horizontal stands. This does away with twisting of the billet, shortens the length of the mill and has the advantage of saving guide equipment; it increases the hourly production, and permits smaller billets being rolled from larger ingots. This line of blooming mill, reversing mill, and the continuous horizontal-vertical mill, has a capacity, on the average run of sizes, including a considerable tonnage of 1½-in. billets, of 1,250,000 tons in terms of ingots. This straight line of mills is followed by cross bays containing the billet storage and reheating furnaces of the various finishing mills. These consist of three mills for medium sections and merchant bar, and a wire-rod mill with a wire-drawing department. The furnaces for the finishing mills are all designed for blast-furnace gas-heating with regeneration and recuperation, similar to that of the soaking pits.

The second group of mills consists of a slabbing mill and a 100-in. continuous strip mill with cold-rolling department. The future, third and fourth, units of the plant were visualised as being similar to the first two in respect to blast-furnace and steel plant, but having in their respective rolling-mill departments, rail and structural mills for the rolling of larger sections in the third group and two narrower continuous strip mills in the fourth group.

The power plant is located at the end of the canal between the latter and the main elevated four-lane highway mentioned before. This power plant is one of the largest in the country, containing 180,000 installed kw. It is being built in two sections, each containing two 40,000-kw. turbo-generators and a house set of 10,000 kw. The two houses have a joint, very elaborate switchboard and control station from which boilers and generators are automatically operated.

LINZ PLANT

The Linz plant was designed on a smaller scale than the Brunswick plant, being built for 1,000,000 tons of ingot capacity, but with the possibility of considerable extension if and when required. It is located directly on the Danube River at its confluence with the Traun. The plant site is outside of Linz on flat land, with very favourable sub-soil for foundations, practically no piling being required. On account of being hemmed in by the two rivers and existing railroad lines, one being the main line from Munich to Vienna, it was not possible to make the same ideal layout as for the Brunswick plant. The slip or harbour was dug across the site at approximately a right angle to the river. The coke plant lies on one side of the slip and blast furnaces, steelworks and rolling mills on the other, with a bridge carrying the coke belt and gas mains across.

The coke plant consists of six batteries of Otto and Still ovens of sufficient capacity to supply not only the Linz furnaces, but also the existing furnaces at the Donawitz plant, which is located on the southern slope of and quite close to the Styrian Erzberg (Iron Mountain). This plant up to now has obtained its coke by rail all the way from the Ruhr district. The by-product department at Linz will be similar to that of the Brunswick plant. The blast-furnace plant now being built consists of six furnaces, three with a 20-ft. and three with a 23-ft. hearth, the two sizes being selected to suit different ore mixtures.

The ore-preparation plant is substantially the same as at Brunswick, but without Lurgi concentration, and with no "Renn" installation for supplying concentrate to the Ruhr district, as the limey ores are low in silica and contain more lime and manganese than needed for self-fluxing. No roasting kilns have been installed, such as are used at Donawitz, but sufficient sintering capacity to sinter more than one-half of the ore. A percentage of siliceous Bavarian ores may be mixed in with Styrian ores to supply the lack of silica.

Boiler and blowing plant, hot-blast stove and gas-washing plant are the same as at the Brunswick plant, except the disintegrators have been left out between tower washers and electric precipitation plant on account of the cleaner ore used.

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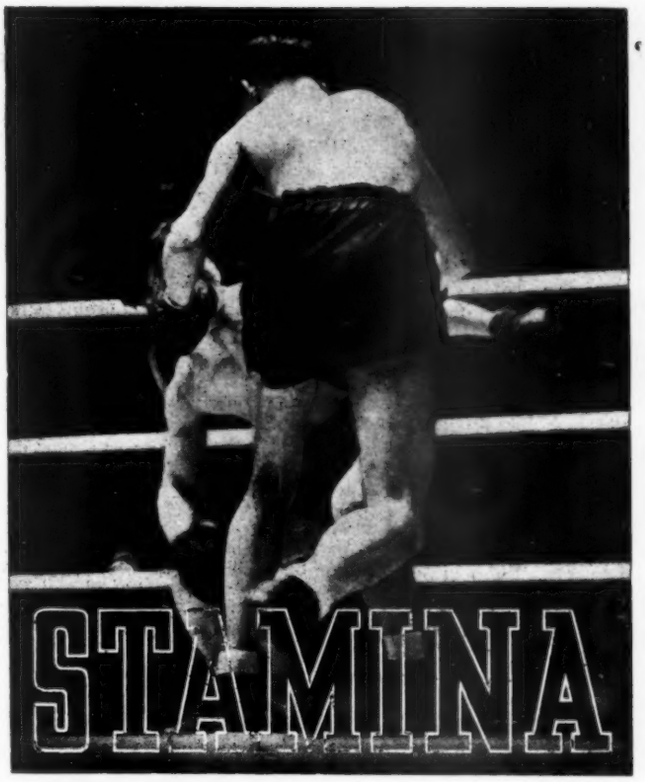

. . . Gee, but this boy's tough! He's taken terrific punishment . . . twice he seemed practically 'out.' Yet here he is in the last round, actually forcing the . . . oh! a lovely left to the head, followed by a hard right to the body . . . and another! The crowd is on its feet . . . he's definitely on top . . . fighting like a champion! What a come-back . . . what stamina!

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Notes from the Branches

EAST ANGLIA

In accordance with a recent decision of the Council, the postponed programme of the East Anglian Section of the Institute of British Foundrymen for the 1939-40 session opened with a visit on March 28 to the works of Reavell & Company, Limited, Ipswich, by kind permission of the directors. Between 20 and 30 members attended, and they were welcomed by Mr. H. A. Hartley. During the tour the visitors were able to inspect work in progress in the patternshop, chemical laboratory, foundry, machine shop, erecting shop and test house. They saw many different sizes and types of compressors in course of construction, ranging from a rotary unit for use in laboratories and hospitals which requires only a 1/30-h.p. motor to drive it, up to the largest turbo compressors and exhausters dealing with volumes of from 5,000 cub. ft. per min. upwards, depending on the delivery pressure.

An interval was made in the tour of inspection during which tea was served. Mr. G. Hall voiced the members' thanks for the firm's kindness in allowing the visit, and his remarks were supported by Mr. L. E. Slater.

A meeting was held later in the day at the Central Library, Ipswich, the Senior Vice-President (Mr. Geo. Hall) occupying the chair. The honorary secretary (Mr. J. L. Francis) submitted the annual report, of which the following is an abstract.

Since the last annual general meeting, membership has decreased by 4 (3 members transferring to other Branches), and now comprises 52 members and associate members and 1 member firm. The 1939-40 programme consisted of six lectures, a works visit and a dinner, but upon the outbreak of war, because of travelling difficulties and the black-out, the entire programme was postponed. A major factor which influenced the Council in making this decision was that 66 per cent. of the members reside away from Ipswich.

The Council has now decided to carry out the winter programme during the summer months, and four meetings are to be held, one on the second Thursday in each month, commencing from April 11.

Although the Section has not been very active during the past six months for the reasons given, the President (Mr. H. H. Shepherd) has done his best to maintain contact with every member by means of a series of monthly letters. These have been in the nature of little talks, and they have been much appreciated.

The report concludes with an expression of the Council's confidence that members will continue to give their enthusiastic support to the Section and that they will realise that the utmost is being done to ensure continuance of its functions in wartime.

Election of Officers.—Because of suspension of activities during the winter, it was agreed to ask the President and Vice-Presidents to remain in office for another year. They are:—*Branch-President*, Mr. H. H. Shepherd; *Vice-Presidents*, Mr. Geo. Hall and Mr. C. J. Lake; *Hon. Secretary*, Mr. J. L. Francis. *Councillors*: Mr. J. King and Mr. D. Carrick (for three years), and Mr. C. H. Kain (for one year).

The meeting concluded with a short technical discussion. Mr. W. L. Hardy raised the topic of rebonding moulding sands, and this resolved itself into an exchange of views on natural bonding *versus* synthetic sand made from additions of bentonite or Colbond. Mr. A. F. Hammond raised the subject of machining allowance, heads and risers, whilst the topical subject of blacking-out foundries was put forward by Mr. L. Tibbenham. Helpful comments and suggestions were not lacking.

(*Continued in next column.*)

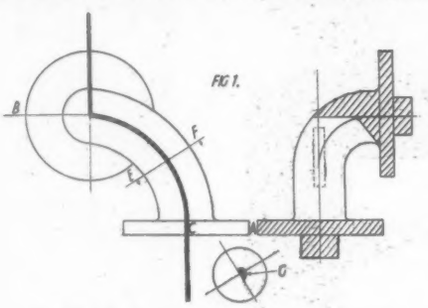
Correspondence

[We accept no responsibility for the statements made or the opinions expressed by our correspondents.]

A Novel Dowel

To the Editor of THE FOUNDRY TRADE JOURNAL.

SIR,—I was interested in the article entitled "A Novel Dowel" by "Foundryman" in your March 21 issue. As a patternmaker who has made several double bend pipes, including engine manifolds, I would have split the pattern described as indicated in the amended drawing [reproduced below]. The planes shaded are parallel and could be easily dowelled by plug and



METHOD ADVOCATED BY MR. SHEPHERD.

socket, etc. I have included core prints, the core box being split along the same line. I should appreciate "Foundryman's" criticism very much.—Yours, etc.,

ERIC SHEPHERD.

Bradford, Yorks.

["Foundryman" replies:—I entirely agree with Mr. Shepherd that the pattern could be split and dowelled as described by him, but maintain that for the specific job referred to in the article the method adopted was best, because of the thinness of the flange and small diameter bore—which was only 1½ in.—which should have been specified in the original description, but was inadvertently omitted.]

(*Continued from first column.*)

FALKIRK

The annual general meeting of the Falkirk Section of the Institute was held on March 29, when there was a large attendance of the members. A feature was an illustrated lecture on "Metallurgical Coke" by Mr. Arthur Grounds, B.Sc., of Scottish Tar Distillers. Mr. John Donaldson (President) occupied the chair.

Before the business commenced MR. J. M. PRIMROSE recalled that at a previous meeting of the Section it had been stated that Carron Company was responsible for the development of the balanced-blast cupola. That statement, which was not strictly correct, had gone out to the iron-founding industry. The fact was that Carron Company, Grangemouth Iron Company, and three English companies had co-operated in the work. Mr. Primrose made this statement of correction, not for any personal reason, but because he wished that a mistaken impression would not be gained by persons in future who might prepare records of the foundry industry.

Proceeding to the business, the CHAIRMAN mentioned that the Committee had considered whether it would be advisable to ask existing office bearers to continue during the war period. It was ultimately decided that there should be the usual election, and the following were chosen for the ensuing year:—*Section President*, Mr. Alexander Cunningham; *Senior Vice-President*, Mr. Thomas Tyrie; *Junior Vice-President*, Mr. George Wilson; *Honorary Secretary*, Mr. T. R. Goodwin. Mr. W. Paterson, Mr. Thomas Nicholson and Mr. Thomas Moodie were re-elected to the Committee.

Development of Steel-Foundry Production Methods

(*Continued from page* 274.)

country. He also referred to the question of skilled and semi-skilled men working on moulding machines.

DR. DADSWELL replied that in general the craftsmanship for good-class work was about the same in each country, but was very high on the Continent, particularly in Northern France, where in steel foundries machine moulding was not very elaborately developed.

A MEMBER asked if it were possible to make castings in green sand which would machine up without pinholes and blowholes, and whether the old clay crucible pots which used to be crushed up almost universally in this country for making compo were not better than old gas retorts or the chamotte mentioned by Dr. Dadswell as a development in the making of compo for heavy castings.

DR. DADSWELL replied that it was certainly possible to make green-sand castings which were machined at any point, as he himself was making weekly a very large tonnage of steel green-sand castings of varying weights which were machined. No distinction was made between a machined or unmachined casting as to whether it should be planned for green-sand moulding as long as it came into the category of size allocation.

He added that the compo made of chamotte was every bit as good as that made from clay crucible pots and old retort, but one must remember that the grading and mixtures might have to be varied according to the raw materials used, and it was not necessarily correct to replace, say, old crucible pot by an equivalent amount of chamotte.

Sand Data

MR. N. D. RIDSDALE, F.C.S., asked for figures of the permeability, moisture content and green strength of sand recommended by the author for green-sand moulding.

DR. DADSWELL replied that the permeability should be greater than 150 (say an average of 175), the moisture content should be in the region of 3 to 3.5 per cent., and a green strength of 6 lbs. per sq. in. should be obtained if possible.

MR. J. G. BAILES asked if there had been, in the author's opinion, any improvement in craftsmanship in the last 25 to 30 years, and also what other outstanding development there was for heavy steel castings.

DR. DADSWELL did not think that there had been a marked improvement in craftsmanship, particularly on heavy castings, as it had been very good for many years. There was an improvement in the planning of big jobs from the point of view of equipment and method of attack by the management.

MR. PUGH drew attention to the fact that one important addition during the period mentioned was the introduction of oxy-acetylene cutting for the removal of heads. That had enabled the founder to produce sounder castings, because he now put his feeder heads where they were required and not where they were easy to saw off.

The meeting concluded with a vote of thanks, proposed by Mr. Pugh and seconded by Mr. Swift.

Book Review

Calvert's Mechanics' Year Book for 1940 Published by Sherratt & Hughes, Park Road, Timperley, Altrincham. 65th edition. Price 8d., post free.

This little book contains 160 pages of well-chosen technical matter, including many dozens of tables, which must be of very considerable help to mechanics holding responsible jobs. Wisdom has been shown in keeping the size and weight down to really pocket capacity.

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	Carbon (Graphi	Carbon (Com-bined)	Silicon	Sulphur	Phos-phorous	Man-ganese
FOUNDRY—MILK	3.0 to	0.04	4.0 to 5.0	0.01 to 0.03	1.35	1.2
No. 1	3.	0.08	2.5 to under 4.0	0.01 to 0.02	1.35	1.2
No. 2		0.12	2.0 to under 4.0	0.02 to 0.03	1.35	1.2
No. 3	3.25	0.24	2.0 to under 4.0	0.03 to 0.04	1.35	1.2
No. 4	3.10	0.50	2.0 to 3.	0.04 to 0.06	1.35	1.1
FORGE—No. 4	2.80	0.50	2.0 to 3.	0.06 to 0.10	1.35	1.0

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IRON CO. LTD. CHESTERFIELD

The Week's News in Brief

Trade Talk

WHITEFIELD FOUNDRY, LIMITED, is being wound up voluntarily.

CARRON COMPANY has been granted permission to extend the existing machine shop by the addition of a bay 100 ft. long by 20 ft. wide.

THE NORTH BRITISH LOCOMOTIVE COMPANY, LIMITED, Springburn, Glasgow, have received an order for 31 duplicate boilers for the South African Railways.

THE MANGANESE BRONZE & BRASS COMPANY, LIMITED, is to capitalise £102,325 of its share premium account and issue a scrip bonus on the ordinary and preference shares. The bonus on the ordinary shares is equivalent to 200 per cent.

ADDITIONAL TO the Export Groups given in the JOURNAL last week, two more have been set up within the engineering industry. They are the Motor Industry Export Group (covering private and commercial cars, accessories and parts), of which Mr. A. O. Tookey, of Hobart House, Grosvenor Place, London, S.W.1, is secretary, and the Sugar Machinery Export Group, with Mann, Judd, Gordon & Company, of 142, St. Vincent Street, Glasgow, as secretary.

IN A LARGE Northern industrial area, of 415 factories, workshops and industrial premises inspected, 159 have requirements in excess of the provisions of the Civil Defence Act of 1939. In 208 other firms the organisation was found to be satisfactory, and employees well trained. Of the remaining 48 firms, 36 had defective organisation, and have been notified to make improvements without further delay. Twelve firms admitted defects due to trained members of the staff being called up for military service, but are carrying out reforms in an effort to attain the standard asked for.

IN THE ANNUAL REPORT of the Cardiff Incorporated Chamber of Commerce, which was submitted at the annual meeting held recently, it is stated that since the war began industrial activity has increased in many directions and the general level of employment has shown an improving tendency. The production of steel and pig-iron has been substantially increased in South Wales. In the activities of local trading estates, the South Wales and Monmouthshire Estates have maintained progress. At the end of the year there were 99 factories, employing 3,694 workpeople, at the Treforest Trading Estate. This compares with 70 factories a year ago. In other directions, also, progress can be reported.

ORDERS for steel rails and fishplates, aggregating £750,000, including freight, have been placed by the South African Railways and Harbours Administration with two Canadian firms. One order for 57,000 tons of steel rails at a value of £570,000 is being shared equally by the Dominions Steel Corporation and the Algoma Steel Corporation, Limited. The second order for 2,000 tons of fishplates has been placed with the Algoma Steel Corporation. It will be recalled that when the South African Railways and Harbours Administration placed an order in July last for 66,000 tons of steel rails at a total net value of £601,000, more than one-third of the order went to these two Canadian firms, the bulk being placed with United Kingdom firms.

Contracts Open

Belfast, April 25—Iron castings, oxide of iron, cast-iron pipes, compo pipe and pig lead, for the Town Council. The Engineer, Gasworks, Ormeau Road, Belfast.

Cleator, April 17—Provision and laying of approximately 4,560 yds. of 5-in., 4-in. and 3-in. dia. spun-iron pipes, together with specials, valves, etc., for the Moresby Water Supply, for the Ennerdale Rural District Council. The Engineer, Council Chambers, Cleator, Cumberland. (Fee £2 2s., returnable.)

Totnes, April 19—Construction and maintenance of about 1,000 yds. of 3-in. and 900 yds. of 2-in. spun-iron water main, etc., for the Avonwick Water Supply, for the Rural District Council. Lemon & Blizard, consulting engineers, 24, Lockyer Street, Plymouth. (Fee £3 3s., returnable.)

Personal

MR. T. A. DAVISON has retired after 48 years' service with Vickers-Armstrongs, Limited.

LIEUT.-COL. THE HON. R. M. PRESTON, who was elected President of the Institute of Metals at the recent annual general meeting, is managing director of the Rio Tinto Company, Limited.

MR. MICHAEL DEWAR, chairman of British Timken, Limited, manufacturers of ball, roller and tapered roller bearings, and Mr. F. J. Pascoe, financial director of British Timken, Limited, have been elected to the board of Fischer Bearings Company, Limited, Wolverhampton.

MR. D. N. TURNER, J.P., managing director of the Staveley Coal & Iron Company, Limited, has been presented by the directors and staff of the company with a three-quarter length portrait in oils of himself. In the painting Mr. Turner is seen wearing his robes of office as High Sheriff of Derbyshire.

Wills

HAMILTON, LORD E. W., director of Brown Bayley's Steel Works, Limited	£7,043
WILLEY, J. H., of Sheffield, managing director of Flockton, Tompkin & Company, Limited, steel manufacturers	£40,015
HUNTER, SUMMERS, of Stocksfield, Northumberland, formerly chairman and managing director of the North Eastern Marine Engineering Company (1938), Limited, of Wallsend and Sunderland	£55,621

Obituary

MISS A. JENKINS, secretary of James Cartland & Sons, Limited, brassfounders, of Small Heath, Birmingham, has died. She was with the firm for some twenty-five years.

An Enamelling Exhibition

(*Continued from page* 270.)

corner was reserved for Mr. Faulkner, who exhibited his collection of souvenir spoons, mainly of Continental origin. German-made tea-sets carrying nursery rhymes in English were another exhibit.

James Gray & Sons, Limited, displayed a remarkably fine picture carried out in vitreous enamelling, a bomb from the last war similarly treated, and a few samples of the latest types of requisites for the trade. In this field an illuminating magnifying glass was particularly attractive. Medals for enamelling exhibits dating back to 1922 represent perhaps the earliest awards germane to this industry. Materials for vitreous enamelling were shown by Union Oxide and Chemical Company; Johnson, Matthey & Company and the Lempriere concern. National Enamels, Limited, the firm with which the chairman is connected, showed gas cooker parts, electric iron shoes and some special laboratory apparatus, whilst the Elm Works had an imposing display of advertising signs, and a quantity of well-executed jobbing lines.

After tea had been served in an adjoining room, Mr. Charles read an exceedingly interesting Paper on the enamelling of artistic ware. This is to be printed in our enamelling supplement. Unfortunately, it will lose something of its interest because the lecturer had available at the meeting a plethora of beautiful and interesting examples showing the results of the various processes used throughout the ages. Later he exhibited a film showing the methods used by the Blythe Colour Works in the production of frits and enamel powders.

The afternoon will long be remembered as one of the most attractive ever organised by a technical institute, and as an example of the art of impromptu organisation it was certainly outstanding.

Company Meetings

General Refractories, Limited

An all-round increase in business was reported at the annual meeting of General Refractories, Limited, which was recently held in Sheffield. SIR RONALD W. MATTHEWS (chairman) said that trading conditions in the early part of 1939 were extremely difficult, so much so that the group turnover for the first three months was approximately 26 per cent. lower than that for the corresponding period of 1938. For the remainder of the year there was a gradual improvement in the group sales which, for the last nine months, increased 19 per cent. as compared with a similar period in 1938, but the total group sales for the whole 12 months only showed an increase of 6½ per cent. as compared with the previous year. Generally speaking, with the exception of the businesses of two of their subsidiary companies manufacturing specialised products, the demand for which was inherently spasmodic, there was an all-round increase in all departments of the group's business, the most significant expansion being in the sales of basic bricks, although there was also a gratifying increase in the sales of various types of sands and silica products. The firebrick section of the group's business was the last one to show any improvement, but there had been, for some time, very substantial orders on the books for the higher class of firebrick products. The increase in trading profits, however, was not entirely accounted for by the increase in turnover. The consolidation scheme was, for all practical purposes, completed by the end of May, 1939, and the unification of control and reduction in standing charges which had resulted therefrom materially contributed towards the improved results of the group during the second half of the year, and these benefits had helped to offset the increases in production costs which had not been wholly covered by increases in the selling prices of their finished products.

British Aluminium Company, Limited

They had further records to report for the year 1939, both as regards production and volume of sales, said MR. R. W. COOPER (chairman) at the annual meeting of the British Aluminium Company, Limited. The aggregate production at their older works was higher, but the largest increase took place at Lochaber works, and they still had a materially greater output to look forward to from this source. Extensions at their various works, which were in progress a year ago, were duly completed, and further substantial additions were now in course of being carried out. Their new alumina factory was successfully put into commission in the spring of last year and was already being enlarged. They had decided to proceed immediately with the construction of the last stage of the Lochaber scheme and work had already commenced. Up to the outbreak of hostilities they were vigorously and successfully developing the use of aluminium. Their policy had always been to endeavour to find outlets for aluminium where it would justify itself on account of its efficiency and economy. Consequently, much research and experimental work had always preceded salesmanship. For the time being, all development work in the commercial and industrial fields had necessarily ceased. They felt confident, however, that the work which had been done in popularising their metal had been of a kind which would ensure that when happier times returned aluminium would not be displaced from the position which it had won. Meantime, in addition to the well-established application of the metal in the construction of aircraft, transport vehicles, and ships, ingenuity and research were constantly finding new directions in which it was able to take its place in the equipment of the Fighting and Defence Forces.

Forthcoming Events

APRIL 15.

Works Management Association (Midland Branch):—"Problem of Skilled and Semi-skilled Labour and the Training and Absorption of Men and Youths into Industry," discussion opened by Alderman Ager, at the Chamber of Commerce, New Street, Birmingham, at 6.30 p.m.

APRIL 19.

Institution of Mechanical Engineers:—"Problems of the Singing Propeller." Paper by Prof. W. Kerr, Dr. J. F. Shannon and Dr. R. N. Arnold, at the Institution, Storey's Gate, St. James's Park, London, S.W.1, at 6 p.m.

Institute of British Foundrymen

APRIL 18.

Middlesbrough and District Branch:—Annual general meeting, followed by Short Paper Competition, at the Cleveland Technical Institute, Corporation Road, Middlesbrough, at 7 p.m.

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Raw Material Markets

The Minister of Supply has made the Control of Iron and Steel (No. 8) Order, which came into force on April 8, superseding the Control of Iron and Steel (No. 6) Order, made on January 29 last.

The main purpose of this new Order and the Direction (No. 1) made thereunder is to give legal effect to the new scheme for the distribution of steel supplies. Under the provisions hitherto in force certain classes of purchasers were exempted from the licence requirement when purchasing steel for specified purposes, but in future, for the products included within the new distribution scheme, this exemption will be limited to purchases covered by a symbol and contract or reference number the use of which is authorised by the appropriate Department.

Although the Order came into force on April 8, the operation of the Direction in connection with the scheme is postponed in the case of future orders for steel products covered by the scheme until Monday, April 29, and, in the case of old orders for such products, until May 31, 1940, so as to give time for the allotment through the various channels of the symbols, contract or reference numbers and delivery periods.

Attention is called to the fact that under the new Direction all licences for steel products covered by the scheme heretofore issued to stockholding merchants are revoked. These should, therefore, be returned forthwith to the Iron and Steel Control. Arrangements have been made for the immediate replacement of these licences by new licences. All other existing licences remain in operation subject to the provisions of the new distribution scheme. Licences and exemption from licences for materials not covered by the scheme will continue as heretofore.

Increases in maximum prices have been fixed for certain more highly finished products, notably crown iron, colliery arches and accessories, galvanised sheets, tubes and pipes, certain types of wire and wire products, steel castings, and railway coil and laminated springs. Crown bars are now quoted at £14 2s. 6d. for English, Welsh and Scottish delivery, colliery arches and accessories at £13 18s. 6d., and galvanised sheets at £20 16s. 3d.

Maximum Price for Refined Malleable Iron

The new scheme of distribution applies only to steel, and the only change in the new Order of direct interest to the foundry-iron trade is the fixing of a maximum price of £7 16s. 6d., delivered Birmingham and South Staffordshire stations, for refined malleable pig-iron. The increase in steel castings is effected by adding 9 per cent. to the scheduled rates, the Order stating that prices shall be those "set out in the related schedules with the addition of 9 per cent., plus 3s. 4d. per ton."

Prices for iron castings which have not been subjected to any process other than moulding, fettling, annealing or painting are to be:—(*a*) For rainwater and soil goods, gutters and connections—the prices set out in the related schedules; and (*b*) for products not covered as such by any related schedule—the seller's latest price ruling in 1939 before September 1, 1939, with the addition in both cases (*a*) and (*b*) of 8 per cent. plus 13s. 4d. per ton (or an equivalent percentage), and also of any appropriate extras set out in the related schedules for alloy additions.

A firm tone continues to prevail in most sections of the iron trade. The iron requirements of the steelworks are substantial, but there is an ample number of blast furnaces engaged on the manufacture of iron for this purpose, although reserves both at producers' and consumers' works are slender. Heavy engineers are busy on Government work and consumption of low-phosphorus iron and hematite is large, leaving very little surplus; in fact, there is some difficulty in meeting the full requirements in some instances, but the position is being watched carefully, and it is hoped in the near future to bring additional units of production into operation.

Pig-Iron

MIDDLESBROUGH—Ironworks in the Cleveland district continue to be almost solely concerned in satisfying the needs of the steel industry, users of foundry iron formerly produced in the local works now obtaining their supplies from the Midlands. Fortunately, adequate tonnages are available to meet the requirements of Cleveland iron consumers and Midlands producers are despatching satisfactory deliveries. In the circumstances, it is improbable that there will be any early resumption of the make of Cleveland iron, as the furnaces are fully employed on hematite and basic iron production. Production of foundry iron in this area is likely to be suspended indefinitely during the war, although there may be some output from time to time. Users would, of course, welcome the opportunity to buy local iron. There are substantial transport costs involved under the present system, while there is also the burden on the railways to be considered.

Hematite is being taken up steadily, and there is no difficulty in disposing of full productions. The Easter holiday relief is still felt, as many consumers were idle while makers continued to operate. Sheffield and Midlands users are drawing on the resources of the Cleveland district, all deliveries being subject to licence. Inquiries from overseas are still pouring in, but little attention can be given to this trade at the moment, owing to the strength of the home demand.

LANCASHIRE—A variable state of trade continues to be reported among foundries in this area. The jobbing concerns, on the whole, are accepting deliveries for quite substantial tonnages, but the same cannot be said regarding light-castings establishments, which, for the most part, are still poorly employed, despite a slight improvement in recent weeks. Textile-engineering concerns are quite well placed for orders, and consumption is moderate, while speciality engineers are in possession of large Government contracts, precluding the extension of their books in most instances. Deliveries of hematite are coming forward adequately to meet a good demand.

MIDLANDS—On account of the quietness of the light-castings trade, demand for high-phosphorus iron in the Midlands is dull. Light foundries cannot, nor do they, place much reliance upon an expansion of home trade, as their most important outlet, the building industry, appears to be destined to be neglected for the duration of the war, but it is anticipated that the general movement towards an improvement in the export position of the United Kingdom will be favourably reflected in the light-castings business. There is also some consolation to be found in so far as the nation's war effort is concerned, as it is quite probable that light castings will play a more important part in the Government's armament programme in the future than is the case at the present time. The strength of the demand for low-phosphorus iron and hematite gives some indication of the position now obtaining among heavy engineering concerns, together with machine-tool and motor foundries. Full productions of these irons are taken up over a long period ahead, and there is every prospect of a steady expansion in consumers' requirements. Makers' reserves are slender, and they are consequently having to rely on their current outputs, which, it is hoped, will be improved in the near future.

SCOTLAND—Pig-iron continues to be well taken up in this area. Imports of basic iron are substantial, but still the demand is not easily satisfied. Shipyard specifications are responsible to a considerable extent for the high rate of operations prevailing among heavy foundries, but light-castings foundries are, as yet, badly placed for work, although at certain works there is steady improvement in order-books. The industry, taken as a whole, however, is in need of very much more work. Iron for this trade is being obtained from the English Midlands.

Coke

Foundry coke is being delivered to the consuming plants very freely, as most users are keen to acquire fresh stocks to replace their reserves, which were depleted when inclement weather interfered with deliveries early in the year. Fortunately, ovens are in a position to meet their commitments. Thus, the foundry-coke trade is likely to be maintained for some time to come, and the current restocking movement should go a long way to ensuring an adequate supply of coke at the consumers' works should any further delay be experienced in the matter of deliveries.

Steel

The attention of the steel industry is, somewhat naturally, mainly focused at the present time on the new Government scheme for the regulation of supplies, which came into operation on the first day of this month. Consumers and producers are not yet clear as to how the Order will work, but in official circles it is expected that all sections of the trade will benefit. Presumably, steel consumers doing Government work will receive deliveries in accordance with their requirements, while other users' applications for steel will be considered on their merits. It is imperative that the needs of the munitions makers be satisfied before those of the ordinary steel buyer. It is appreciated that time will elapse before it can be stated that the plan is in full working order, but every effort will be made by Government departments, with the co-operation of the industrialists, to regulate available supplies of steel so that deliveries are despatched to destinations most deserving of attention. Production continues apace, and more regular deliveries of scrap are coming to hand.

Scrap

As stated above, supplies of old metal have recently been sent to the steelworks in larger tonnages. It is still essential to import material, but every effort to put to good use all home produced scrap iron and steel is being made—and with gratifying results in many areas. Doubtless, the recently increased prices have reacted advantageously on the market.

Metals

Owing to the control of the copper trade, there is little to report; supplies are being despatched regularly to consumers working on Government department contracts and only a limited quantity is available for other users. In the United States the condition of the copper market is very dull and Customs smelters are accepting as little as 11.12½ cents per lb., compared with the primary producers' level of 11.50 cents.

A report from San Francisco reveals that the Allied intention to strengthen the blockade of Germany is already having its effect on the shipment of metal from America to the U.S.S.R. Germany is believed to have procured valuable supplies of metal in the past "through the back door." It is understood that a Russian steamer chartered to take 4,000 tons of copper ingots from Los Angeles to Vladivostock has cancelled the undertaking. This, it is disclosed, is the first consignment of a shipment from Arizona and copper in extensive proportions was planned to be shipped to Vladivostock. Agents are attempting to induce Scandinavian freighters plying in the Pacific to take the copper.

According to Mr. W. H. Gartsen (Henry Rogers, Sons & Company), the total visible supply of tin on March 31 was 22,980 tons, against 23,865 tons at the end of February. The carry-over in the Straits Settlements was 3,897 (4,168) tons, while the carry-over at principal European smelters was 4,776 (4,689) tons. A feature of the March returns is a further decrease of stocks reported in the United Kingdom from 2,529 tons to 1,703 tons, the lowest level since 1937. A year ago stocks in this country were as high as 12,750 tons, a figure which comprised a heavy tonnage held on behalf of the buffer pool. Last month there was a sharp increase from 5,011 to 10,029 tons in the shipments from the Straits to the United States.

The tin market on the London Metal Exchange still does not give rise to much interest. Speculation is negligible, which is somewhat unusual for the tin market. Consumption of both spelter and lead is maintained at a high level, with supplies for urgent work being licensed by the Ministry of Supply satisfactorily in most instances.

Metal Exchange prices for tin this week have been as follow:—

Cash—Thursday, £249 10s. to £250; Friday, £249 10s. to £249 15s.; Monday, £250 5s. to £250 10s.; Tuesday, £250 15s. to £251; Wednesday, £252 5s. to £252 10s.

Three Months—Thursday, £246 5s. to £246 10s.; Friday, £246 10s. to £246 15s.; Monday, £247 15s. to £248; Tuesday, £248 10s. to £249; Wednesday, £250 to £250 5s.